

Traffic Data Collection and Analysis for Pavement Design

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Traffic Inputs for 2002 Design Process

AADT_i

AADT by Vehicle Class –

CV_i

Coefficients of Variation

MDF_i, MDF_{ij}

Monthly Distribution Factors

HDF

Hourly Distribution Factors

LS_{ij}

**Load Spectra
(by class and axle group type)**

AGPV_{ij}

Axle Groups Per Vehicle

Linear or exponential growth rate

For Level 3B Classification Sites –

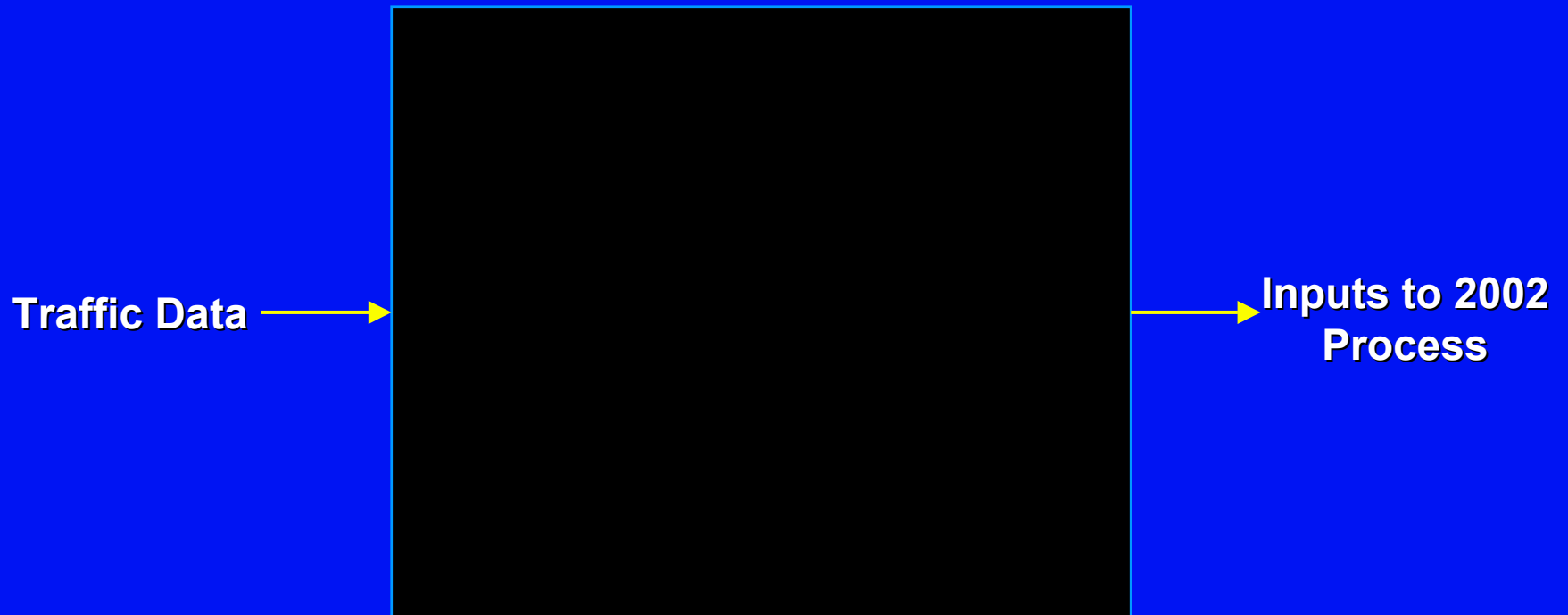
AADTT

Annual Average Daily Truck Traffic

TTC

Truck Traffic Classification Group

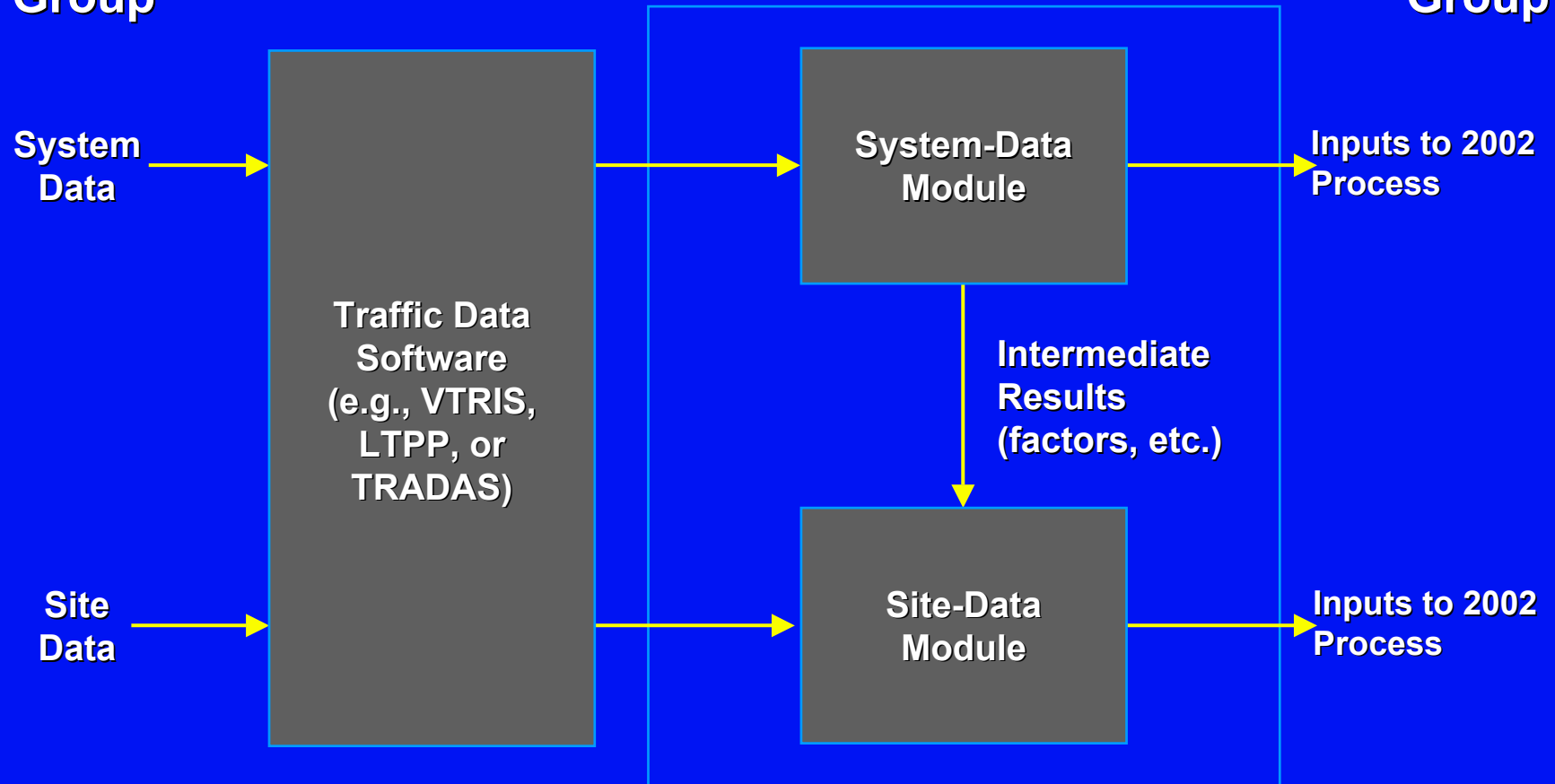
NCHRP 1-39 Software



NCHRP 1-39 Software

Traffic
Data-Collection
Group

Pavement
Design
Group



Inputs

- **System Data**

- **Mostly from continuously monitored (AVC or WIM) sites**

- **Site Data**

- **AVC and WIM data from all other sites of interest**

Vehicle Classes

- Users' choice
- Axle-based classes will produce better results
- Maximum of 20 classes

Can use extra classes for:

3-2s

Triples

etc.

Classification Counts

Assumptions

- Highway agencies collect data using modern, calibrated, reliable data collection equipment
- Highway agencies perform quality assurance reviews on data prior to making them available to NCHRP 1-39 software

Classification Counts

System Data Sites

1A. Classification counts for

- **At least one week**
- **At least 12 consecutive months**

Classification Counts

Other Sites

- Software will provide user with multiple options for data collection
- Higher level options will produce better pavement designs but generally will require more data collection

Site Data Options

- 1B.** On same road as “nearby” Type 1A site; AVC data for at least 24 consecutive hours
- 2M7.** Three or four 7-day AVC counts spaced over a year
- 2M48.** Three or four 48-hour AVC counts spaced over a year
- 2S7.** One 7-day AVC count
- 2S48.** One 48-hour AVC count
- 2SM.** Manual classification count for at least 6 hours
- 3A.** Volume count on same road as a “nearby” Level 1 or 2 site
- 3B.** Volume count at any other site

Seasonal Factors

- Separate factors by classification group and seasonal factor group
- Classification groups
 - Single-unit trucks (SUTs) (or “short trucks”)
 - Combinations (or “long trucks”)
- Seasonal factor groups (user-defined roadway groupings)
 - For example
 - Rural interstate
 - Rural other
 - Urban
- Applied to all Level 2 classification counts

Day-of-Week (DOW) Factors

- Separate factors by classification group and DOW factor group
- DOW factor groups (user-defined roadway groupings, defined separately for SUTs and combinations)
 - For example
 - Roads on which nearly all traffic is locally generated
 - Roads with moderate amounts of non-locally generated traffic
- Applied to all Level 2 classification counts **except** 2M7 and 2S7

WIM Data

WIM Data

- We assume that the data provided to NCHRP 1-39 software is
 - From a calibrated scale
 - Has been checked for quality

WIM

System Data Sites

1A. WIM data for 12 consecutive months

1M7. WIM data for multiple 7-day periods over one year

WIM

Other Sites

1S7. WIM data for a single 7-day period

1SD. WIM data for less than 7 days

2. No WIM data – site assigned to a Truck Weight Road Group (TWRG)

3. No WIM data – site not assigned to a TWRG

Truck Weight Road Group (TWRGs)

- Groups of roads distinguished by region and/or functional system
- All roads in group have essentially identical size and weight limits
- There are at least five system WIM sites in each TWRG (for this purpose, sets of three or more 1S7 sites can be treated as a system site)
- There should be at least three TWRGs
 - For example
 - Rural interstate
 - Rural other
 - Urban

Mean Average Percent Errors (MAPEs) in Estimates of ESALs/Truck

Alternate Sources of ESALs Estimates	Estimated MAPE
1SD. In-pavement WIM at site (48 hours) – factored	7%
1SD. In-pavement WIM at site (48 hours) – unfactored	8%
WIM in poor pavement at site (48 hours)	?
Portable WIM at site (24 or 48 hours)	?
2. Regional Defaults (TWRGs)	22%
3. Statewide Defaults	25%

Load Spectra

- **Weight Distributions for:**

- Single axles**

- Tandem axles**

- Tridem axles**

- Quad axles**

- **From WIM Data**

Load Spectra

- **For Level 1 Sites:**

- **Obtained directly from WIM data for site**

- **For Level 2 Sites:**

- **Obtained by averaging data from all Level 1 sites in the TWRG**

- **For Level 3 Sites:**

- **Obtained as weighted averages of TWRG values**

WIM Data Summary

- Requires more WIM data than is currently being collected in many states
- Will produce much better estimates of damage factors than currently being used
- Damage factors will be produced as load spectra – as required by the 2002 Guide